Hurricane Matthew

September 28-11 October 2016

The National Hurricane Center initiated tropical storm advisories September 28th on an easterly topical wave passing the Windward Islands that had developed a closed circulation. Tropical Storm Matthew tracked west ward over the eastern Caribbean south of a strong subtropical ridge with an initial intensity of 58 miles per hour.

Despite persistent 17-23 mph westerly shear, Matthew intensified to a 75 mph hurricane during the afternoon of September 29th. Hurricane Matthew began rapid intensification overnight on the 29th and continued to rapidly intensify, more than 63 mph in less than 24 hours, to 138 mph as the hurricane churned westward at 12 mph. Late on September 30th , based on objective satellite analysis and aircraft reconnaissance flights through the eyewall, the National Hurricane Center increased Matthew's intensity to 160 mph, the first North Atlantic Basin Category 5 hurricane in 11 years.

After a series of eyewall replacement cycles, Matthew's intensity weakened slightly to 150 mph as the hurricane slowed to less than 5 mph and began a slow, meandering turn to the northwest October 1st-2nd in response to the southeastern extent of the subtropical ridge and a deepening trough over the eastern United States. Shear and eyewall replacement cycles further reduced the hurricane's intensity to 138 mph as Matthew tracked slowly northwards towards the southern coasts of the Greater Antilles.

On October 4th, Hurricane Matthew made a morning landfall near Les Anglais on the southwestern tip of Haiti with 140 mph sustained winds. Matthew continued north through the Windward Passage making landfall near Juaco on the northeast coast of Cuban overnight on October 4th. For the previous 36 hours, the trough over the eastern United States filled and lifted northeast, depriving Hurricane Matthew of steering towards an open ocean escape to the northeast, away from the Southeast United States. In the wake of the exiting migratory trough weak ridging built into the eastern United State and the subtropical ridge built in westward turning Matthew to a northwest track across the Bahamas and paralleling the coast of Florida. On October 6th, Hurricane Matthew tracked over the Bahamas with 140 mph winds.

After passing over the Bahamas Hurricane Matthew weakened again in response to another in a series eyewall replacement cycles. As Matthew paralleled the Florida coast on October 7th, the outer eyewall came within 10 miles of the coast as another deepening trough approached from the west. This trough and the subtropical ridge turned Matthew first north then slowly to the northeast along the coast of South Carolina on October 8th. Interaction with land, coastal cool water upwelling, increasing shear, and dry air entrainment associated with the mid-level trough's attendant cold frontal boundary weakened Matthew to a disorganized 75 mph hurricane as it made landfall in South Carolina south of McClellanville, over the Cape Romain National Wildlife Refuge before noon October 8th.

Matthew weakened rapidly interacting with the cold frontal boundary and the trough aloft becoming extra tropical on Sunday October 8th. This extratropical transition and the divergence imbedded in the eastern side of the upper trough produced torrential rains across eastern South Carolina a wide area of eastern North Carolina. Record river levels and flooding persisted in eastern South Carolina and North Carolina for a week after Hurricane Matthew's South Carolina landfall.